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S1D13517 Display Controller

S5U13517P00C100 Evaluation Board User Manual

SEIKO EPSON CORPORATION

Rev. 1.0

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Table of Contents

Chapter 1 Introduction 5
Chapter 2 Features 6
Chapter 3 Installation and Configuration 7
3.1 Configuration DIP Switch 7
3.2 Configuration Jumpers 8
Chapter 4 Technical Description 11
4.1 Power 11
4.1.1 Power Requirements 11
4.1.2 Voltage Regulators 11
4.1.3 S1D13517 Power 11
4.2 Clocks 12
4.3 Reset 12
4.4 Host Interface 13
4.4.1 Direct Host Bus Interface Support 13
4.4.2 Connecting to the Epson S5U13U00P00C100 USB Adapter Board 14
4.5 LCD Panel Interface 15
4.6 GPO and PWM Connections 16
Chapter 5 Parts Lists 17
Chapter 6 Schematic Diagrams 19
Chapter 7 Board Layout 22
Chapter 8 References 24
8.1 Documents 24
8.2 Document Sources 24

Chapter 1 Introduction

This manual describes the setup and operation of the S5U13517P00C100 Evaluation Board. The evaluation board is designed as an evaluation platform for the S1D13517
Display Controller.

The S5U13517P00C100 evaluation board can be used with many native platforms via the host connector which provides the appropriate signals to support a variety of CPUs. The S5U13517P00C100 evaluation board can also connect to the S5U13U00P00C100 USB Adapter board so that it can be used with a laptop or desktop computer, via USB 2.0.

This user manual is updated as appropriate. Please check the Epson Research and Development Website at www.erd.epson.com for the latest revision of this document before beginning any development.

We appreciate your comments on our documentation. Please contact us via email at documentation@erd.epson.com.

Chapter 2 Features

The S5U13517P00C100 Evaluation Board includes the following features:

- S1D13517 Display Controller (128-pin QFP)
- Integrated Silicon Solution, Inc. IS42S16800E-7TLI 128M-bit SDRAM (54-pin TSOP)
- Header with all S1D13517 Host Bus Interface signals
- Headers for connection to the S5U13U00P00C100 USB Adapter board
- Headers for connecting to LCD panels
- Header for S1D13517 GPO pins and PWM pin
- On-board 24MHz oscillator
- 14-pin DIP socket (if a clock other than 24MHz must be used)
- 3.3V input power
- On-board voltage regulator with 2.5V output
- On-board voltage regulator with adjustable 6~24V output, 40mA max., to provide power for LED backlight of LCD panels.

Chapter 3 Installation and Configuration

The S5U13517P00C100 evaluation board incorporates a DIP switch, jumpers, and 0 ohm resistors which allow it to be used with a variety of different configurations.

3.1 Configuration DIP Switch

The S1D13517 has 2 configuration inputs (CNF[1:0]). A DIP switch (SW1) is used to configure CNF[1:0] as described below.

Table 3-1: Summary of Power-On/Reset Options

SDU13517P00C100 SW1-[2:1] Config	S1D13517 CNF[1:0] Config	Power-On/Reset State	
		1 (ON)	0 (OFF)
SW1-[1]	CNF0	Host data bus is 8-bit	Host data bus is 16-bit
SW1-[2]	CNF1	Host interface is ALE bus	Host interface is i80 bus

= Required settings when using S5U13U00P00C100 USB Adapter board

The following figure shows the location of DIP switch SW1 on the S5U13517P00C100 board.

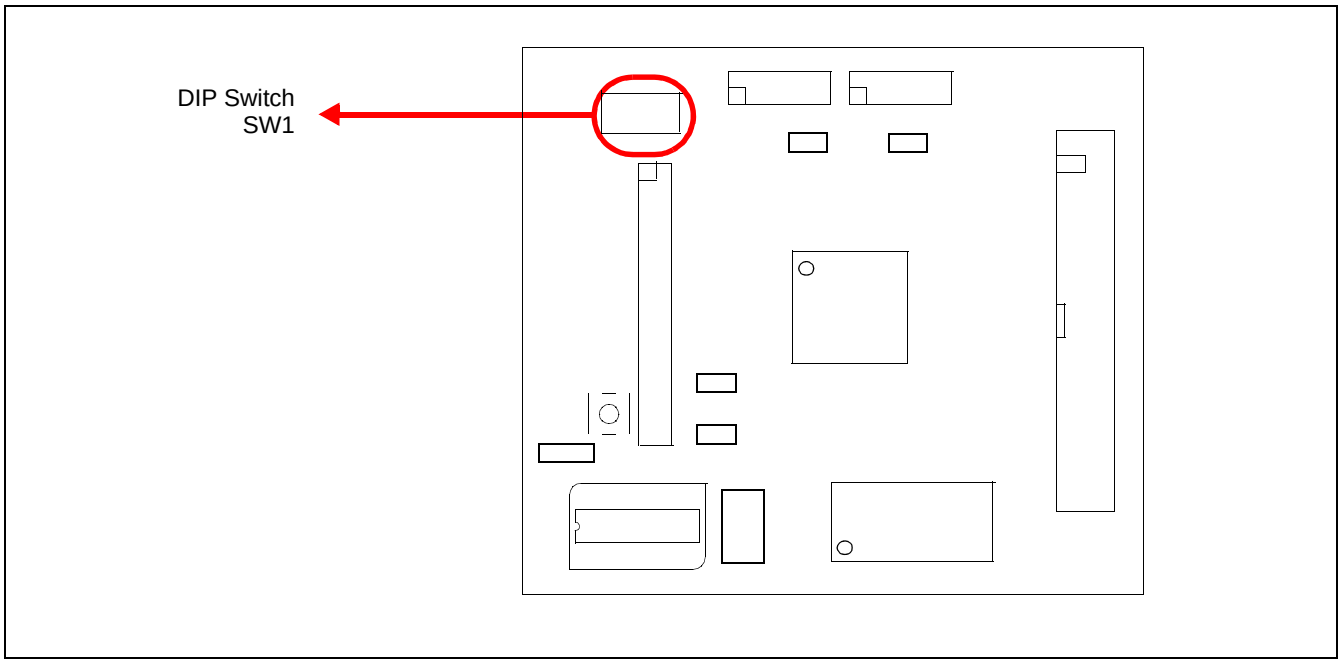

Figure 3-1: Configuration DIP Switch (SW1) Location

3.2 Configuration Jumpers

The S5U13517P00C100 has 6 jumpers which configure various board settings. The jumper positions for each function are shown below.

Jumper	Function	Position 1-2	Position 2-3	No Jumper
J1	COREVDD	Normal	—	COREVDD current measurement
J2	IOVDD	Normal	—	IOVDD current measurement
J3	PLLVDD	Normal	—	PLLVDD current measurement
J4	IOVDD source	3.3V	CN1 connector, pin 32	—
J5	24MHz control	24MHz stop	—	Normal

= Required settings when using S5U13U00P00C100 USB Adapter board

Jumper	Function	Position 1-2	Position 3-4	Position 5-6
J6	Clock source	On board 24MHz	Second oscillator	CLKI pin to GND

J1, J2, J3 - Power Supplies for the S1D13517

J1, J2, J3 can be used to measure the current consumption of each S1D13517 power supply.
When the jumper is at position 1-2, normal operation is selected.
When no jumper is installed, the current consumption for each power supply can be measured by connecting an ammeter between pins 1 and 2 of the jumper.

The jumper associated with each power supply is as follows:

J1 for COREVDD
J2 for IOVDD
J3 for PLLVDD

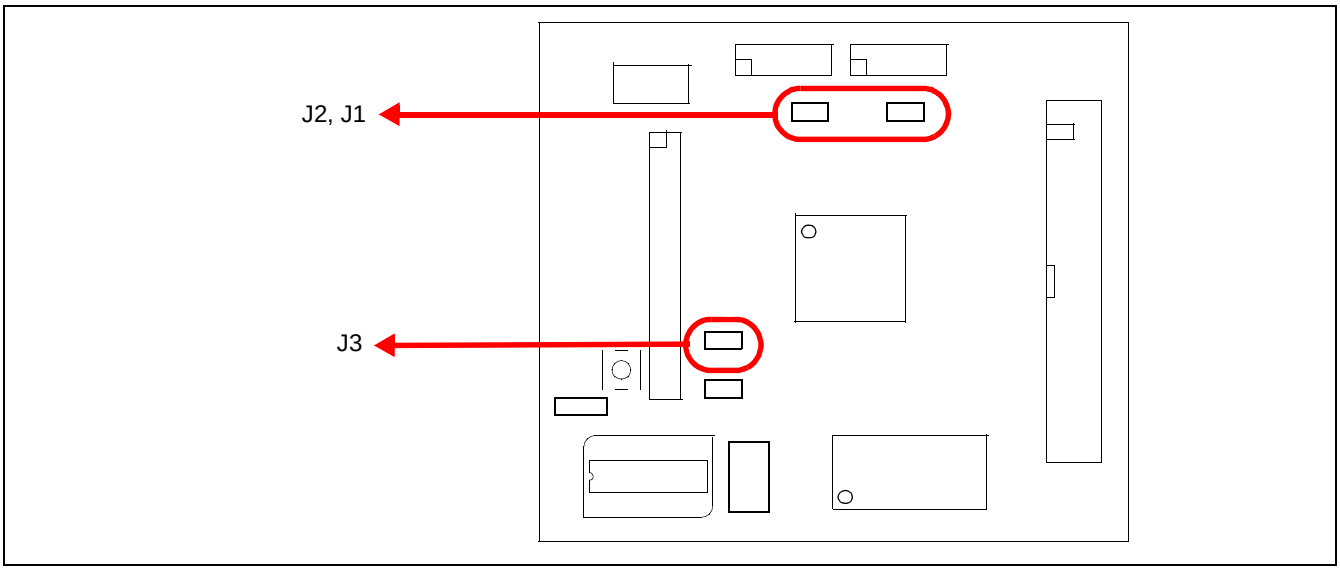

Figure 3-2: Configuration Jumper Locations (J1, J2, J3)

J4 - IOVDD Source

J4 is used to select the source for the IOVDD supply voltage.
When the jumper is at position 1-2, the IOVDD voltage is provided by the 3.3V power supply of the board.
When the jumper is at position 2-3, the IOVDD voltage must be provided to the CN1 connector, pin 32.

J5 - 24MHz Control

J5 is used to control the 24MHz oscillator.
When no jumper is installed, the 24MHz oscillator is running.
When the jumper is at position 1-2, the 24MHz oscillator is stopped.

J6 - Clock Source

J6 is used to select the source for the clock input.
When the jumper is at position 1-2, the on board 24MHz oscillator is selected.
When the jumper is at position 3-4, the second oscillator is selected.
When the jumper is at position 5-6, the CLKI pin is forced to GND.

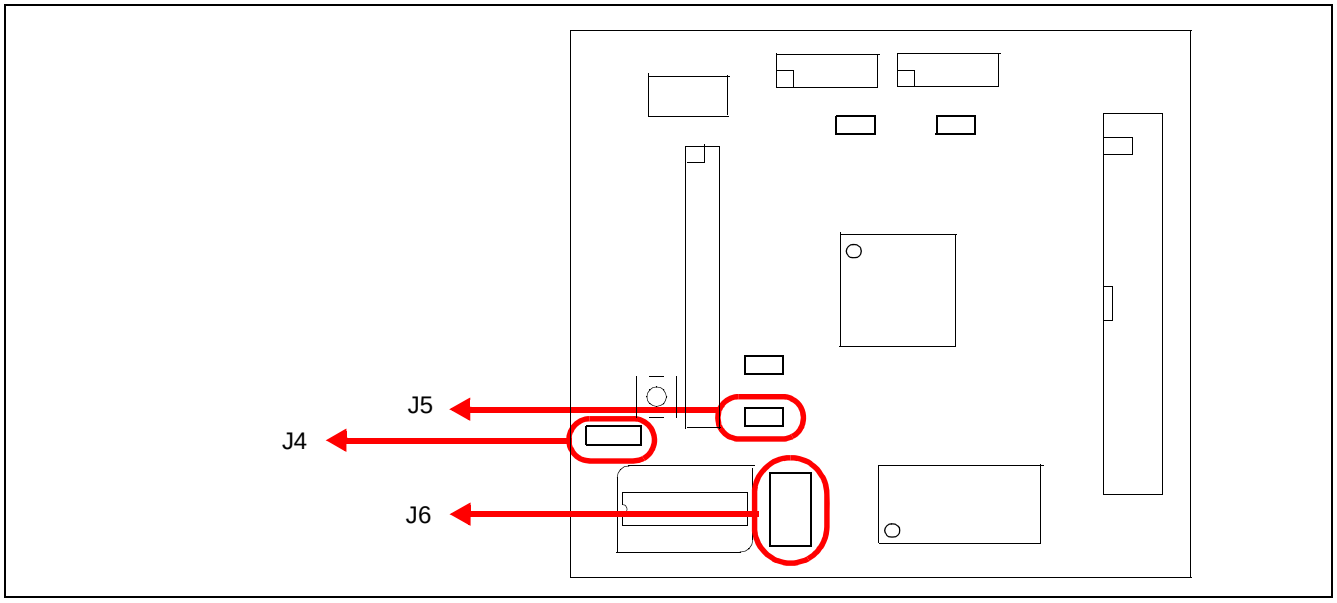

Figure 3-3: Configuration Jumper Location (J4, J5, J6)

Chapter 4 Technical Description

4.1 Power

4.1.1 Power Requirements

The S5U13517P00C100 evaluation board requires an external regulated power supply (3.3V / 0.5A). The power is supplied to the evaluation board through pin 34 of the CN1 header, or pin 5 of the P2 header.

The green LED ‘3.3V Power’ is turned on when 3.3V power is applied to the board.

4.1.2 Voltage Regulators

The S5U13517P00C100 evaluation board has an on-board linear regulator to provide the 2.5V power required by the S1D13517 Display Controller. It also has a step-up switching voltage regulator to generate adjustable 6~24V, which can be used to power the LED backlight on some LCD panels.

4.1.3 S1D13517 Power

The S1D13517 Display Controller requires 2.5V and 3.0~3.6V power supplies.

2.5V power for COREVDD and PLLVDD is provided by an on-board linear voltage regulator.

IOVDD can be in the range of 3.0~3.6V. When J4 is set to the 1-2 position, IOVDD is connected to 3.3V. If a different voltage is required for IOVDD, set JP4 to the 2-3 position and connect the external power supply to pin 32 of connector CN1.

4.2 Clocks

The clock for the S1D13517 Display Controller is provided by a 24MHz oscillator.

The S5U13517P00C100 evaluation board has a DIP14 footprint for an optional second oscillator, Y2. This is provided for cases requiring a different clock frequency for the S1D13517 Display Controller. To use Y2, an oscillator must be populated in the Y2 footprint and the J6 jumper placed at position 3-4.

4.3 Reset

The S1D13517 Display Controller on the S5U13517P00C100 evaluation board can be reset using a push-button (SW2), or via an active low reset signal from the host development platform (pin 33 on the CN1 connector).

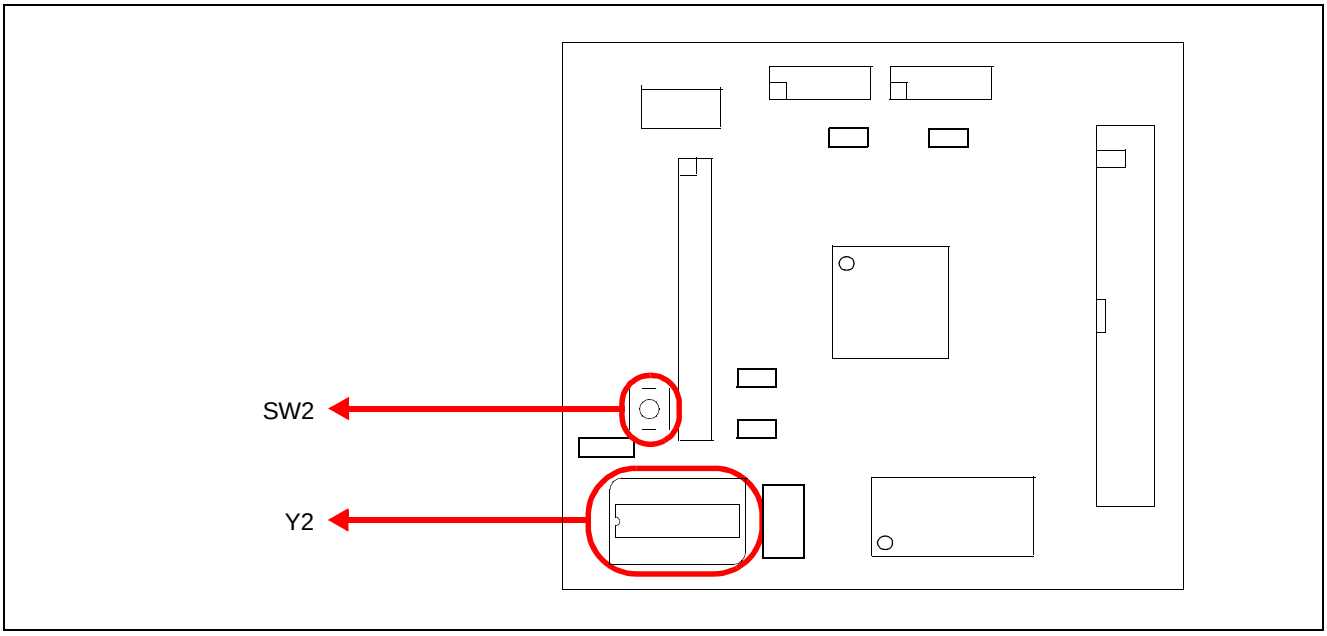

Figure 4-1: Second oscillator and Reset switch Location (Y2, SW2)

4.4 Host Interface

4.4.1 Direct Host Bus Interface Support

All S1D13517 host interface pins are available on connector CN1 which allows the S5U13517P00C100 evaluation board to be connected to a variety of development platforms.

The following figure shows the location of host bus connector CN1. CN1 is a 0.1x0.1 inch 34-pin header (17x2).

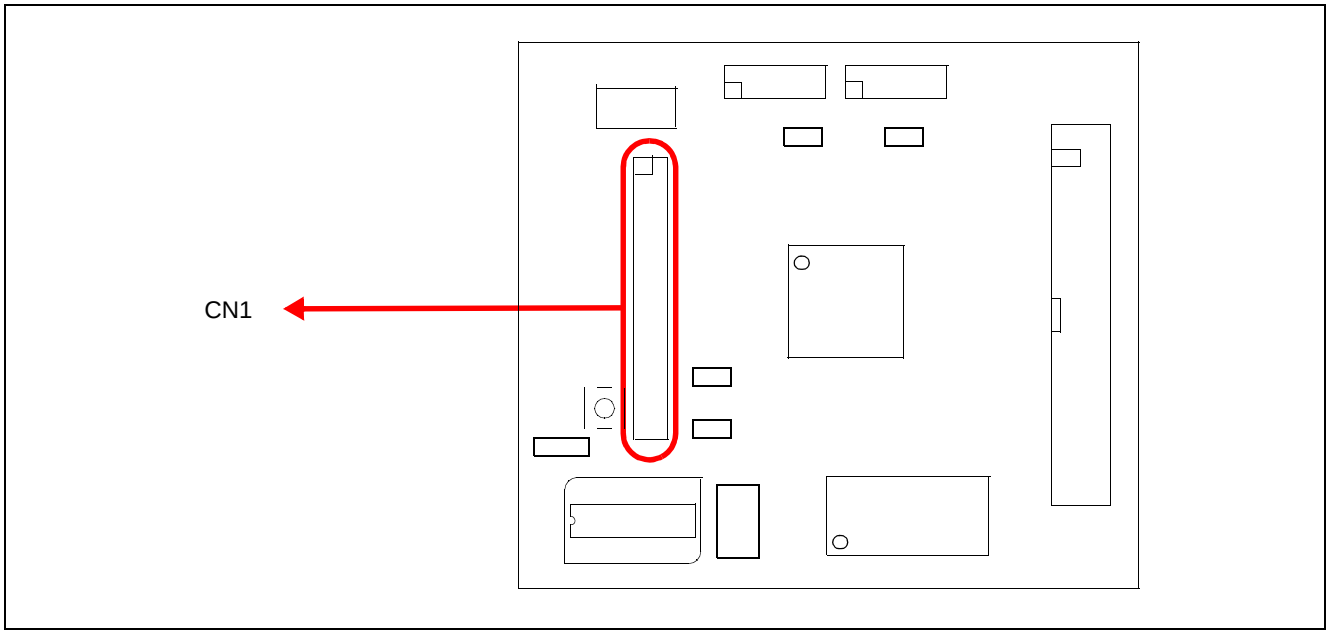

Figure 4-2: Host Bus Connector Location (CN1)

For the pinout of connector CN1, see Chapter 6, “Schematic Diagrams” on page 18.

4.4.2 Connecting to the Epson S5U13U00P00C100 USB Adapter Board

The S5U13517P00C100 evaluation board is designed to connect to a S5U13U00P00C100 USB Adapter Board. The USB adapter board provides a simple connection to any computer via a USB 2.0 connection. The S5U13517P00C100 directly connects to the USB adapter board through connectors P1 and P2.

The USB adapter board also supplies the 3.3V power required by the S5U13517P00C100. IOVDD should be selected for 3.3V and J4 should be set to the 1-2 position.

When the S5U13517P00C100 is connected to the S5U13U00P00C100 USB Adapter board, there are 2 LEDs on S5U13517P00C100 which provide a quick visual status of the USB adapter. LED1 blinks to indicate that the USB adapter board is active. LED2 turns on to indicate that the USB has been enumerated by the PC.

The following diagram shows the location of connectors P1 and P2. P1 and P2 are 40-pin headers (20x2).

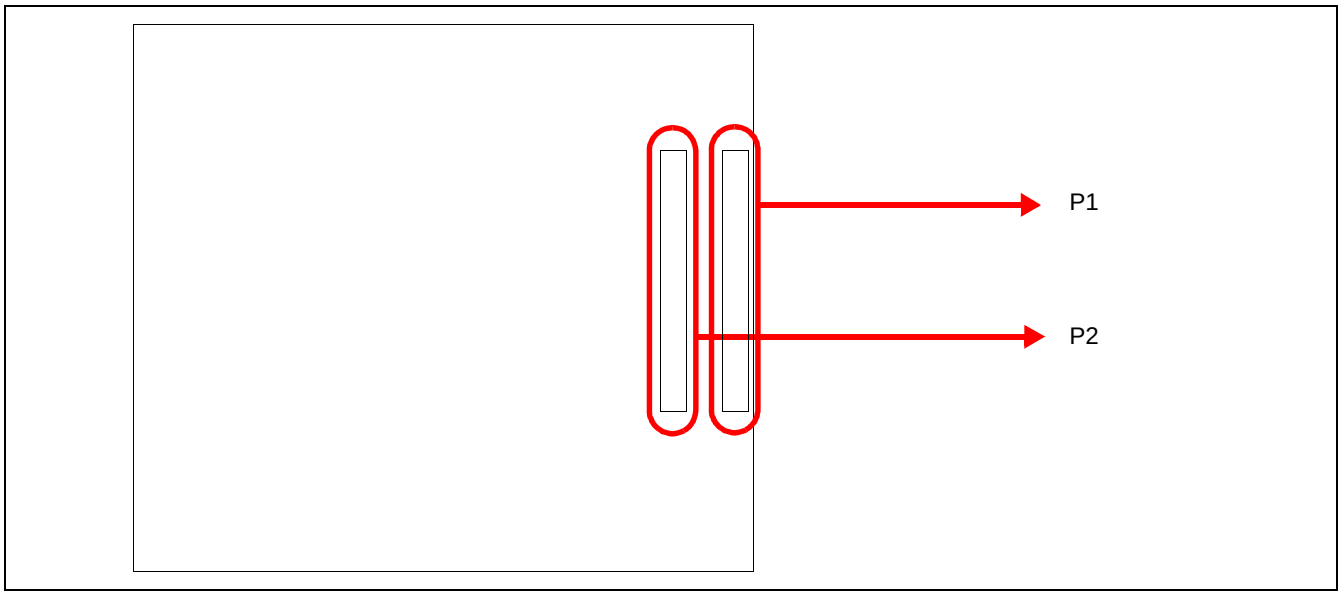

Figure 4-3: USB Adapter Connector Locations (P1 and P2)

For the pinout of connectors P1 and P2, see Chapter 6, “Schematic Diagrams” on page 18.

Note
A windows driver must be installed on the PC when the S5U13517P00C100 is used with the S5U13U00P00C100 USB Adapter Board. The S1D13xxxUSB driver is available at www.erd.epson.com.

4.5 LCD Panel Interface

The LCD interface signals are available on connectors CN3 and CN5.

Connector CN3 is 0.1x0.1 inch 40-pin header (20x2) and connector CN5 is 0.1x0.1 inch 10-pin header (5x2). For the pinout of connectors CN3 and CN5, see Chapter 6, “Schematic Diagrams” on page 18.

On the evaluation board there is an adjustable 6~24V, 40mA max. power supply. This voltage is provided only on connector CN3 (it is not used elsewhere on the board). It is intended for use to power the LED backlight on some LCD panels. The voltage is adjusted by the VR1 pot.

Note
For LCD panels that use a CCFL backlight, an external power supply must be used to provide power to the inverter for the CCFL backlight. Usually, the inverter current consumption is higher than the maximum 40mA current available from the on-board voltage regulator.

The following diagram shows the location of the LCD panel connectors CN3 and CN5.

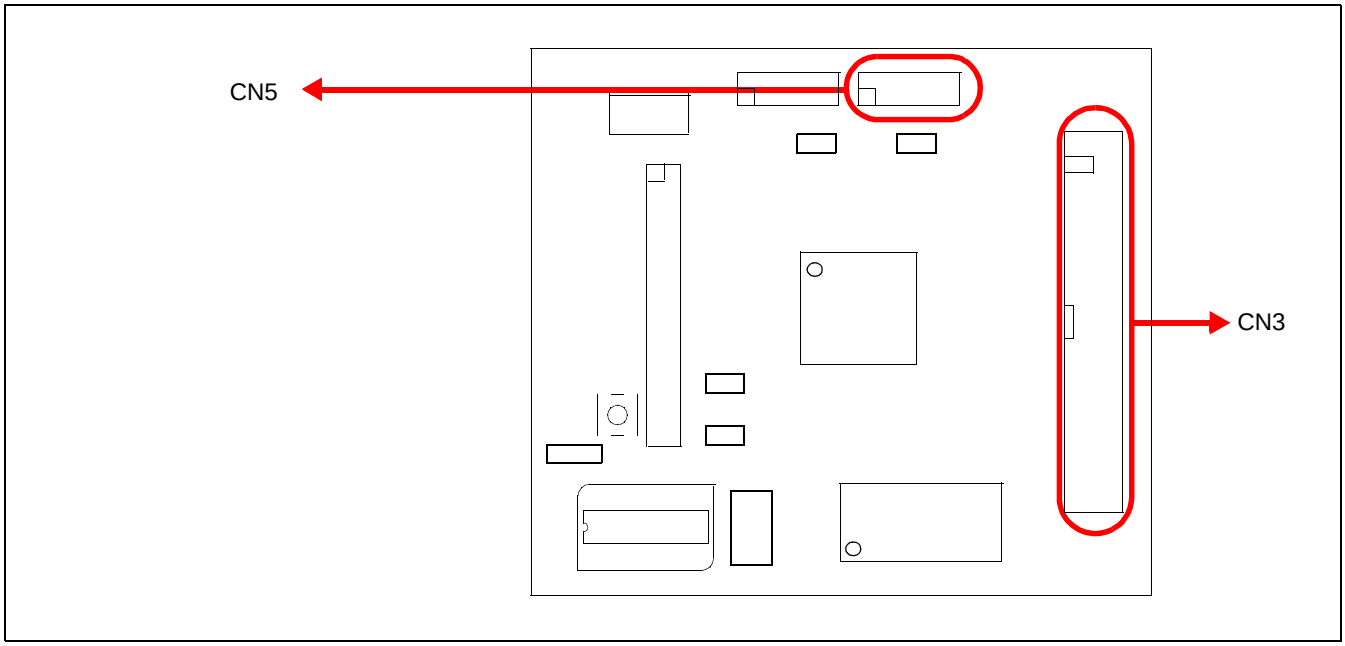

Figure 4-4: LCD Panel Connectors Location (CN3, CN5)

4.6 GPO and PWM Connections

The S1D13517 Display Controller has 4 GPO pins and PWM pin. All the GPO pins and PWM pin are routed to the CN4 connector. Connector CN4 is 0.1x0.1 inch 10-pin header (5x2).

The following figure shows the location of the GPO and PWM connector, CN4.

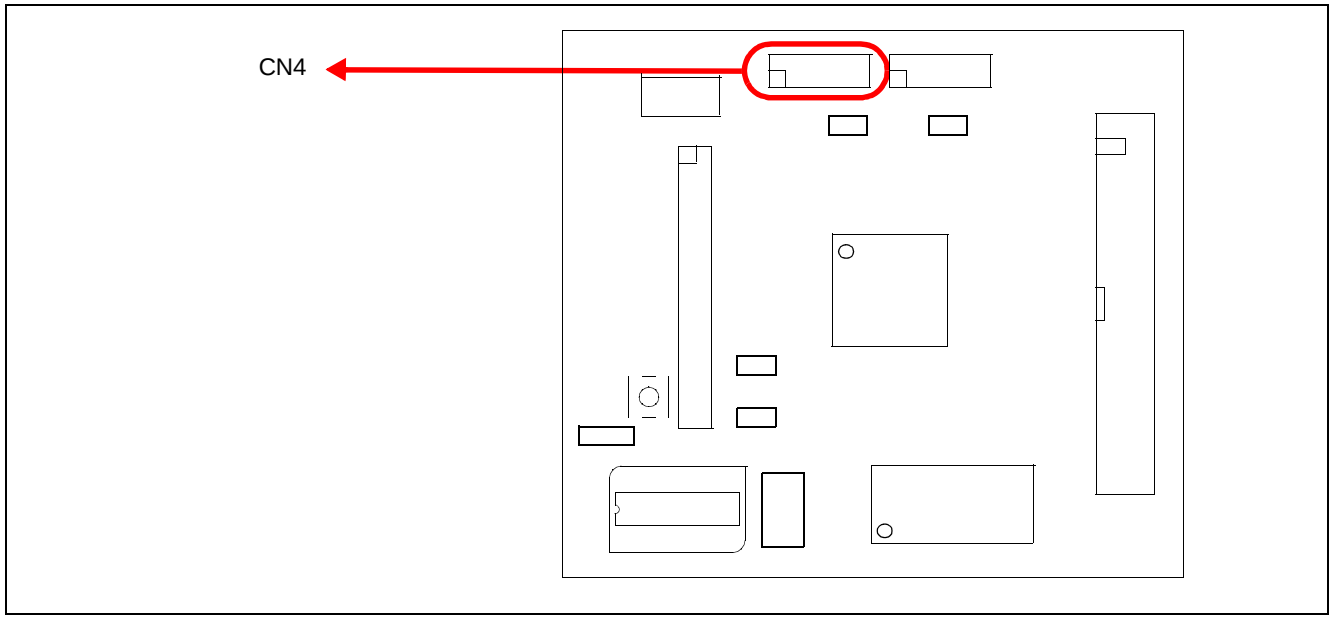

Figure 4-5: GPIO and PWM Connector Location (CN4)

For the pinout of connector CN4, see Chapter 6, “Schematic Diagrams” on page 18.

Chapter 5 Parts Lists

Table 5-1: Parts List

Item	Quantity	Reference	Part
1	1	CN1	A1-34PA-2.54DSA(71)
2	1	CN3	HIF3FC-40PA-2.54DSA
3	2	CN4,CN5	A1-10PA-2.54DSA(71)
4	27	C1,C3,C5,C7,C9,C11, C13,C15,C17,C19,C21, C23,C25,C27,C28,C31, C32,C34,C35,C37,C43, C45,C47,C49,C51,C53, C55	0.1u
5	23	C2,C4,C6,C8,C10,C12, C14,C16,C18,C20,C22, C24,C26,C29,C33,C38, C44,C46,C48,C50,C52, C54,C56	0.01u
6	1	C30	2000p
7	1	C36	100u
8	1	C40	47u 10v
9	1	C41	10p
10	1	C42	1u 50V
11	1	D1	SML-310VT
12	1	D2	SML-310DT
13	1	D3	SML-310PT
14	1	D4	MBR0530
15	2	F1,F2	ACF451832-222
16	4	J1,J2,J3,J5	WL-1-2P
17	1	J4	WL-1-3P
18	1	J6	WLW-3
19	2	L1,L2	BLM21P
20	1	L3	LQH32CN100K23L
21	3	PAD1,PAD2,PAD3	2mm diameter
22	2	P1,P2	PRPN202PAEN-RC
23	1	R1	3k 1%
24	3	R2,R3,R4	10k

Table 5-1: Parts List

Item	Quantity	Reference	Part
25	49	R5,R6,R7,R8,R10,R11, R12,R14,R15,R21,R22, R23,R24,R25,R26,R27, R28,R29,R30,R31,R32, R33,R34,R35,R36,R37, R38,R39,R40,R41,R42, R43,R44,R45,R46,R47, R48,R49,R50,R51,R52, R53,R54,R55,R56,R57, R58,R59,R60	0
26	1	R9	150k
27	2	R13,R17	33 1%
28	1	R16	NM
29	3	R18,R19,R20	270
30	1	R61	887k
31	1	R62	22k
32	1	R63	47k
33	6	SH1,SH2,SH3,SH4,SH5, SH6	.100 in. Jumper Shunt
34	1	SW1	CFS-0400MB
35	1	SW2	SKRKAEE010
36	10	TP1,TP2,TP3,TP4,TP5, TP6,TP7,TP8,TP9,TP10	HK-2-S
37	1	U1	S1D13517
38	1	U2	TPS76915DBVT
39	1	U3	IS42S16800E (128Mbit SDRAM)
40	1	U4	TPS61040
41	1	VR1	200k
42	1	Y1	SG-210 24MHz
43	1	Y2	XR2A-1405

Chapter 6 Schematic Diagrams

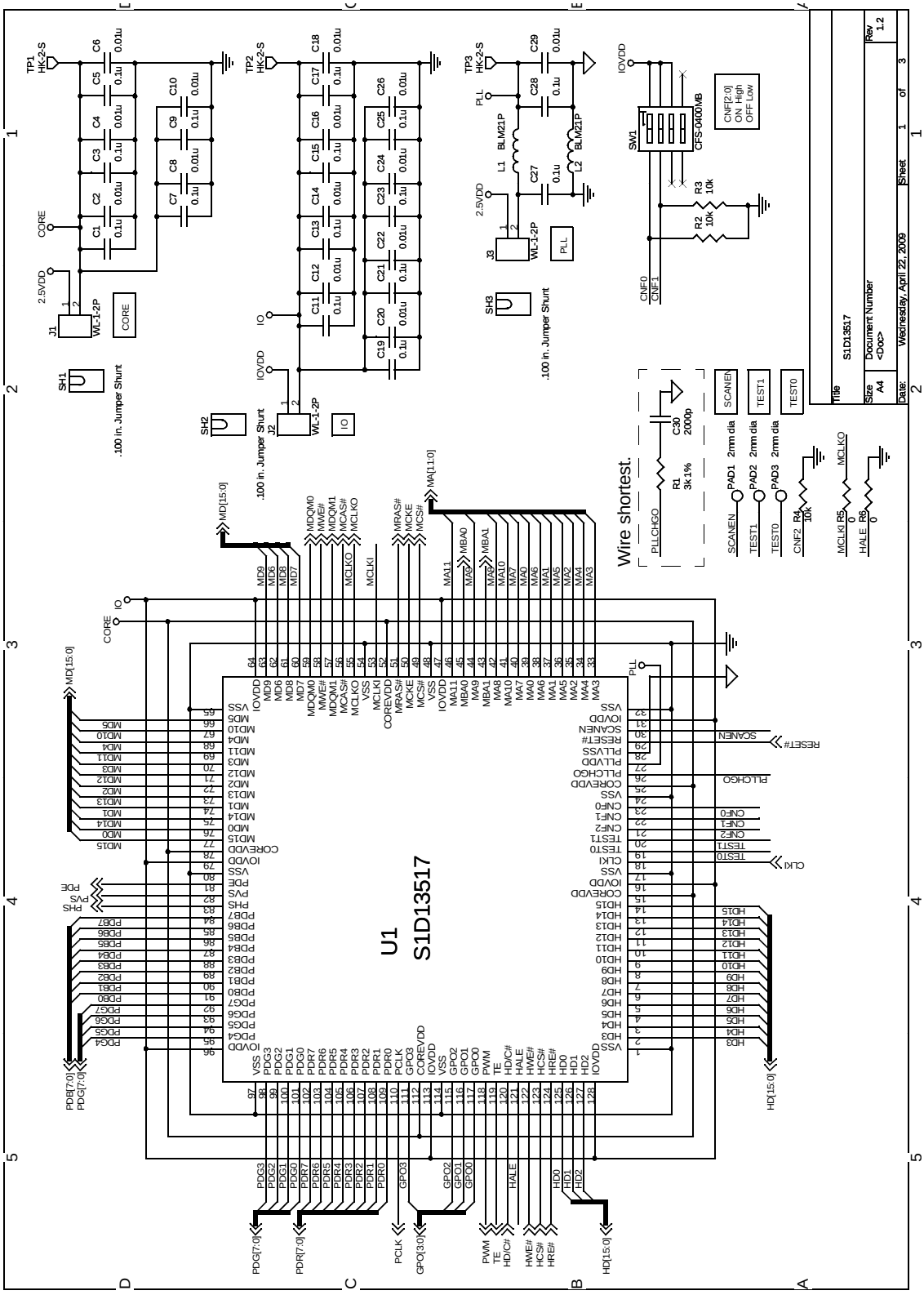

Figure 6-1: S5U13517P00C100 Schematic Diagram (1 of 3)

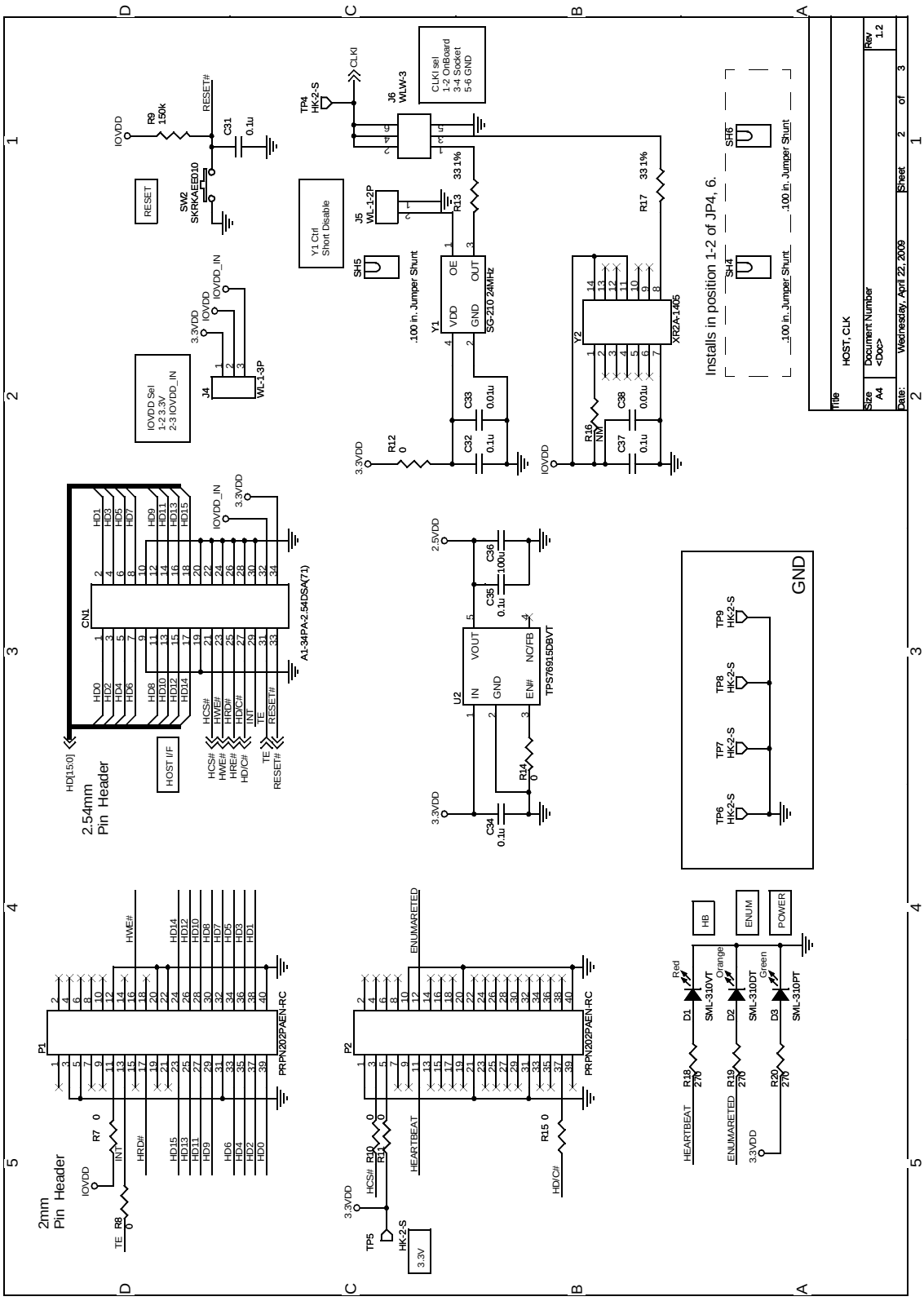

Figure 6-2: S5U13517P00C100 Schematic Diagram (2 of 3)

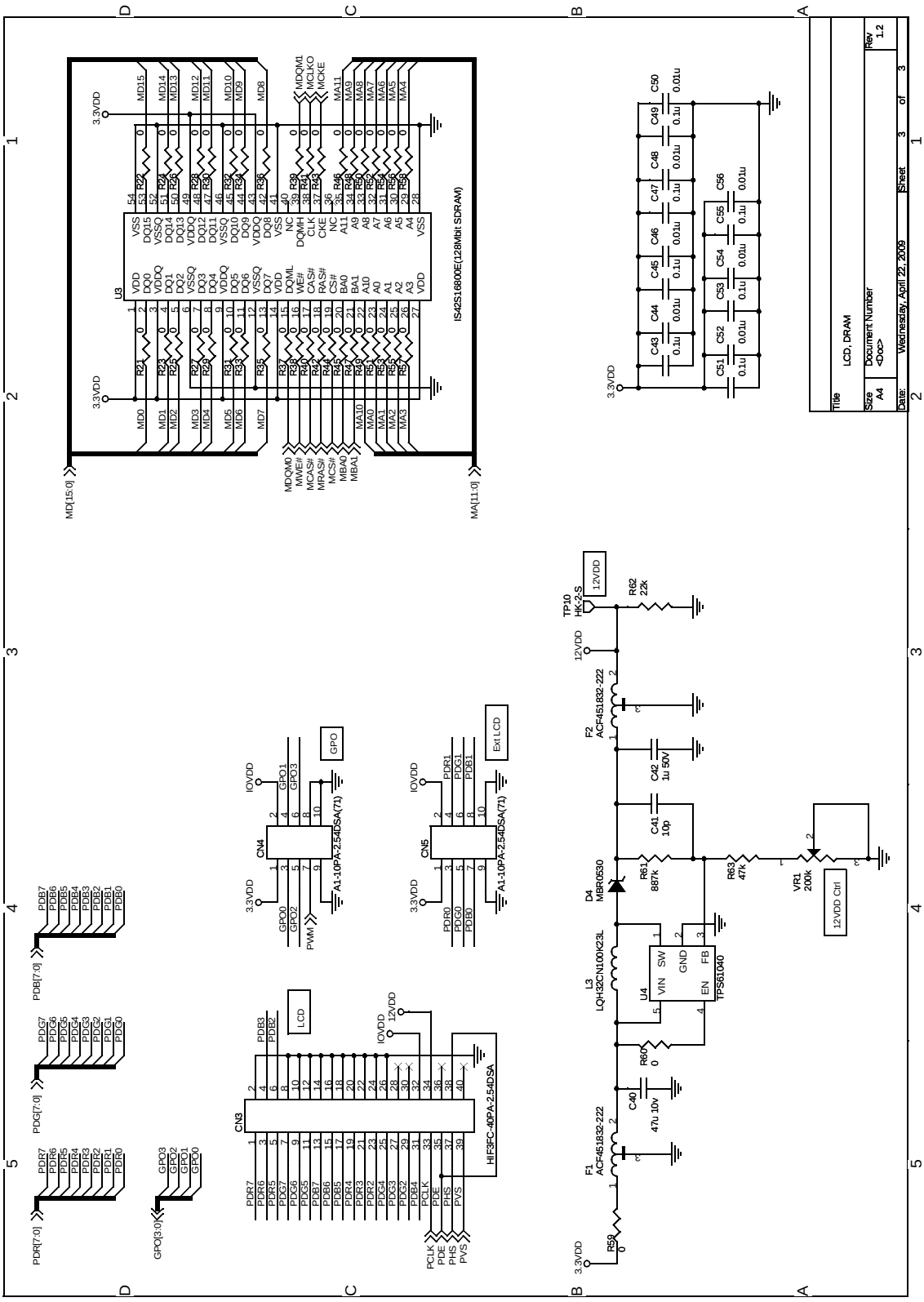

Figure 6-3: S5U13517P00C100 Schematic Diagram (3 of 3)

Chapter 7 References

7.1 Documents

- Epson Research and Development, Inc., *S1D13517 Hardware Functional Specification*, document number X92A-A-001-xx
- Epson Research and Development, Inc., *S5U13U00P00C100 USB Adapter Board User Manual*, document number I00Z-G-018-xx

7.2 Document Sources

- Epson Research and Development Website: http://www.erd.epson.com

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